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Ethnic Disparities in Oral Health Related Quality of Life among Adults in London, England

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Objective: To explore ethnic disparities in oral health related quality of life (OHQoL) among adults, and the role that socioeconomic factors play in that association. ***Research design:*** Data from 705 adults from a socially deprived, ethnically diverse metropolitan area of London (England) were analysed for this study. Ethnicity was self-assigned based on the 2001 UK Census categories. OHQoL was measured using the Oral Health Impact Profile (OHIP-14), which provides information on the prevalence, extent and intensity of oral impacts on quality of life in the previous 12 months. Ethnic disparities were assessed in logistic regression models for prevalence of oral impacts and negative binomial regression models for extent and intensity of oral impacts. ***Results:*** The prevalence of oral impacts was 12.7% (95% CI: 10.2-15.1) and the mean OHIP-14 extent and severity scores were 0.27 (95% CI: 0.20-0.34) and 4.19 (95% CI: 3.74-4.64), respectively. Black adults showed greater and Asian adults lower prevalence, extent and severity of oral impacts than White adults. However, significant differences were only found for the extent of oral impacts; Black adults reporting more and Asian adults fewer OHIP-14 items affected than their White counterparts. After adjustments for socioeconomic factors, Asian adults had significantly fewer OHIP-14 items affected than White adults (rate ratio: 0.28; 95%CI: 0.08-0.94). ***Conclusion:*** This study found disparities in OHQoL between the three main ethnic groups in South East London. Asian adults had better and Black adults had similar OHQoL than White adults after accounting for demographic and social factors.

Key words: *ethnic groups; health status disparities; social determinants of health; oral health; quality of life*

Introduction

Ethnic disparities in oral health are found in several countries, with studies in North America, Europe and Australasia showing that White adults tend to exhibit better dental and periodontal status than other ethnic groups (Dye *et al.*, 2007; Elani *et al.*, 2012; Hjern and Grindefjord, 2000; Mejia *et al.*, 2010). The body of evidence on ethnic disparities in adult oral health in other developed countries contrasts sharply with that in the United Kingdom (UK). The few UK studies conducted to date suggest that ethnic minorities usually had more teeth and lower caries experience than national population averages (Mattin and Smith, 1991; Robinson *et al.*, 2000; Williams *et al.*, 1996). Some authors have suggested that being a member of ethnic minority groups in the UK does not necessarily correspond to having poorer oral health (Dhawan and Bedi, 2001; Watt and Sheiham, 1999) since oral health was similar among ethnic groups from the same socioeconomic position (Watt and Sheiham, 1999).

Measures of Oral Health Related Quality of Life (OHQoL) provide information on the psychosocial impacts of oral conditions that cannot be obtained with clinical measures (Brondani and MacEntee, 2014; Sischo and Broder, 2011). This information is valuable for understanding people's needs and shifting towards patient-centred services (Sischo and Broder, 2011). Three studies have explored ethnic disparities in OHQoL (Newton *et al.*, 2003; Newton *et al.*, 1999; Newton *et al.*, 2000). They reported conflicting results in spite of using the same instrument to measure oral impacts on daily life, namely the Subjective Oral Health Status Indicator (SOHSI). The first two studies found no differences in reported impacts between six minority ethnic groups (Newton *et al.*, 1999; Newton *et al.*, 2000), whereas the remaining study showed that Chinese adults reported more impacts from oral conditions than other ethnic groups (Newton *et al.*, 2003). However, these studies had some limitations. First, they were all based on convenience samples from specific ethnic groups which precluded any generalisation of findings to wider populations. Second, some did not include a sample of White residents but used national statistics for comparison purposes (Newton *et al.*, 1999; Newton *et al.*, 2000). Those that recruited a comparison group from the same geographical area did not adjust for important confounders such as socioeconomic factors (Newton *et al.*, 2003).

Studies in other developed countries have shown that socioeconomic position (SEP) may fully explain ethnic disparities in oral health because ethnic groups are disproportionately overrepresented in the lower social strata (Craig *et al.*, 2001; Craig *et al.*, 2003; Reid *et al.*, 2004) while others have reported the persistence of ethnic inequalities after adjustment for SEP measures (Borrell *et al.*, 2003; Jimenez *et al.*, 2009; Sabbah *et al.*, 2009). Importantly, the composition of ethnic groups varies from country to country which precludes any comparison and it is possible that significant factors influencing the oral health status of minority ethnic groups in one country may not be relevant in another. Two previous studies among adults living in East London have shown ethnic inequalities in dental caries (Delgado-Angulo *et al.*, 2015)2015 and periodontal disease (Delgado-Angulo

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et al., 2016)2016 even after controlling for participants' education or socioeconomic classification.

This study aimed to determine whether there are ethnic disparities in oral health related quality of life among adults from London (England) and the role that socioeconomic factors play in that association.

Methods

A cross-sectional survey was carried out to investigate the perceived oral health status and reported dental attendance behaviour of the resident adult population of Lambeth, Southwark and Lewisham boroughs, with a view to inform the development of a locally sensitive commissioning model for primary care dental services. A stratified multi-stage random sample was used to select a representative, ethnically diverse sample of the general non-institutionalised population aged 16 and over residing in the three boroughs. The Postal Address File (PAF), a database of all valid addresses for postal delivery, was used as sampling frame. Addresses were sorted into postcode sectors within each borough (stratum). Fifteen sectors were selected per borough followed by a random sample of addresses from each sector. Only one adult per eligible household was invited to participate, chosen using the Kish grid method. Sample size calculation was based on the chi-square test for testing the association between ethnicity and prevalence of oral impacts. A sample of 197 individuals at 5% significance level had an 80% power to detect the above association with an effect size of 0.20. Assuming a 50% response rate, a minimum sample size of 400 was required per borough. A target of 1500 addresses was set out (500 per borough); of which 1244 were valid and 770 (62% response rate) agreed to participate (Al-Haboubi *et al.*, 2013). Of the latter, 75 individuals were excluded from this analysis due to missing data on some variables of interest. Therefore, the analytical sample included 695 individuals (56% of the eligible sample).

Ethical approval was obtained from the King's College London Research Ethics Committee. Eligible individuals were read an introductory paragraph explaining the purpose of the survey and given the opportunity to opt out. If they chose to continue with the interview, implied consent was assumed.

Data were collected through home interviews using a structured interview guide, which was based on instruments used in previous national surveys (Kelly *et al.*, 2000; NRS, 2008; Office for National Statistics, 2003). The questions enquired about participants' demographic characteristics (age, sex and ethnicity), socioeconomic position and OHQoL. Twelve trained and experienced interviewers carried out the field work. If participants were unable to communicate in English, the interviewers returned with a translator at a later date.

Ethnicity was self-assigned using an adaptation of the 2001 UK Census, which included 15 possible categories under five main ethnic groups: White, Asian, Black, Mixed and Other (Office for National Statistics, 2003). White adults were asked to classify themselves as White British, Irish or other. Asian adults were asked to classify themselves as Indian, Bangladeshi, Pakistani or other. Black adults were asked to classify themselves as Black African, Caribbean or other. Those of mixed Asian and Black, Asian and White, Black and White, and mixed 'other' ethnicities were categorised as Mixed. Mixed and Other ethnicities were excluded from the analysis due to their relatively small numbers. Participants' socioeconomic position was indicated by the social grade of the chief income earner, which was based on their current job or occupation, employment status, size of organisation and supervisory status (MORI, 2009). Six operational categories were derived: (A) high managerial, administrative or professional, (B) intermediate managerial, administrative or professional, (C1) supervisory, clerical and junior managerial, administrative or professional, (C2) skilled manual workers, (D) semi and unskilled manual workers; and (E) state pensioners, casual or lowest grade workers, unemployed with state benefits only (MORI, 2009). Grades A and B were combined (highest group), as were classes C1 and C2, and classes D and E (lowest group).

The short version of the Oral Health Impact Profile (OHIP-14) was used to measure the adverse effects of oral conditions on individuals' life in the past 12 months (Slade, 1997). OHIP-14 contains 14 questions on seven domains: functional limitation (trouble pronouncing words and worsened taste), physical pain (aching in mouth and discomfort eating foods), psychological discomfort (felt tense and felt self- conscious), physical disability (not satisfied with food choices and interrupting meals), psychological disability (embarrassed and not able to relax), social disability (irritability and unable to do daily work) and handicap (life less satisfying and inability to function). Participants were asked to rate the frequency of impacts using 5-point ordinal scales coded 0 for never, 1 for hardly ever, 2 for sometimes, 3 for fairly often and 4 for very often. The OHIP-14 has been validated for use in the UK (Kelly *et al.*, 2000; Slade *et al.*, 2005). Three outcome measures were derived from participants' responses. The *prevalence of oral impacts* refers to the proportion of people reporting frequent oral impacts and was calculated as those participants reporting one or more items as fairly or very often (codes 3 or 4). The *extent of oral impacts* was calculated as the number of items reported as fairly often or very often, thus ranging from 0 to 14. The *severity of oral impacts* was calculated as the sum of the responses to the 14 OHIP-14 items, thus ranging from 0 to 56 (Slade *et al.*, 2005).

All analyses were weighted to correct for differences in the probability of selection due to non-response and non-coverage, and to adjust for differences in the age-by-sex-by-ethnicity distribution between the sample and the general population 16 years or older in the three London boroughs included in the study, according to the 2001 UK Census (Office for National Statistics, 2003). Analyses also took into account the complex survey design to adjust standard errors and confidence intervals accordingly.

The modelling strategy was first to estimate crude disparities in prevalence, extent and severity of oral impacts, and then gradually adjust for factors that could explain this association. The crude association between ethnicity and oral impacts was first reported (labelled as Model 1), and it was then gradually adjusted for demographic factors (sex, age and borough of residence) in Model 2, and for SEP (social grade) in Model 3. Logistic regression was used to explore ethnic disparities in the prevalence of oral impacts as the latter was a binary outcome. Odd ratios (OR) were therefore reported. Negative binomial regression was used to explore ethnic disparities in extent and severity of oral impacts as the latter two were count variables with over-dispersion. Rate Ratios (RR) were therefore reported from these two sets of models. Finally, the moderating role of SEP on the association between ethnicity and each outcome was examined by testing the significance of the statistical interaction between ethnicity and social grade in a model also including the main effects.

Results

Data from 705 (51% women) adults living in South East London were analysed. The sample included 72%, 23% and 5% of White, Black and Asian adults, respectively. The socio-demographic characteristics of the sample are presented in Table 1. There were differences between ethnic groups by age and social class ($p<0.001$ in both cases) but not by sex ($p=0.363$) or borough of residence ($p=0.406$). Black adults were the youngest, with 8.2% of them aged 65 years and over compared to 15.0% of White and 13.5% of Asian adults. More Asian adults were in the highest social grade (27.0% versus 21.2% for White and 8.1% for Black adults respectively) while more Black adults were in the lowest social grade (49.7% versus 37.1% for White and 21.6% for Asian adults respectively).

The prevalence of oral impacts was 12.7% (95% CI: 10.2-15.1) and the mean OHIP-14 extent and severity scores were 0.27 (95% CI: 0.20-0.34) and 4.19 (95% CI: 3.74-4.64), respectively. There were crude disparities by ethnicity in the extent, but not in the prevalence or severity of oral impacts. The prevalence and extent of oral impacts were significantly higher among women and lower social grades whereas the severity of oral impacts was higher among older age groups (Table 2).

In unadjusted regression models, Black adults reported more items affected (RR: 1.67; 95% CI: 1.20-2.33) and Asian adults fewer items affected (RR: 0.27; 95% CI: 0.08-0.87) than their White counterparts. These differences were attenuated but remained significant after adjustment for demographic factors (sex, age group and borough of residence). However, only the difference between White and Asian adults remained significant after further adjustment for social grade (RR: 0.28; 95% CI: 0.08-0.94). Asian participants also reported fewer items affected than Black adults (RR: 0.21; 95% CI: 0.06-0.73). The two-way interaction of ethnicity and social grade was not significant in any of the three subjective measures (all $p>0.05$).

Table 1. Characteristics of the participants (n=705)

	Variables	*n*[a]	*%*
Gender	Men	312	49.0
	Women	393	51.0
Age group	16-24 years	69	14.0
	25-34 years	145	29.4
	35-44 years	191	21.5
	45-54 years	98	11.7
	55-64 years	82	10.1
	65-74 years	66	7.5
	≥ 75 years	54	5.8
Ethnicity	White	478	71.9
	Black	193	22.8
	Asian	34	5.3
Borough	Lambeth	228	33.7
	Southwark	236	32.9
	Lewisham	241	33.4
Social grade	A/B (highest)	125	18.5
	C1/C2	282	42.4
	D/E (lowest)	298	39.1

[a] All counts are unweighted

Table 2. Prevalence, extent and severity of oral impacts, according to sociodemographic characteristics in 705 adults living in South East London

Variables	*Prevalence*	*Extent*	*Severity*
	%[95% CI]	*Mean[95% CI]*	*Mean[95% CI]*
Ethnicity			
White	12.0[9.2-14.8]	0.25[0.17-0.33]	4.10[3.60-4.59]
Black	16.9[11.0-22.7]	0.37[0.17-0.57]	4.58[3.45-5.70]
Asian	4.2[0.0-10.9]	0.06[0.00-0.16]	3.80[2.08-5.53]
P value	*0.104*	*0.032*	*0.628*
Gender			
Men	9.8[6.6-12.9]	0.17[0.1-0.23]	3.77[3.25-4.30]
Women	15.5[11.7-19.2]	0.37[0.24-0.49]	4.59[3.87-5.31]
P value	*0.023*	*0.006*	*0.073*
Age group			
16-24 years	15.5[8.2-22.7]	0.20[0.10-0.30]	2.89[2.04-3.75]
25-34 years	7.1[3.6-10.6]	0.17[0.07-0.26]	3.22[2.57-3.88]
35-44 years	15.7[9.8-21.5]	0.38[0.16-0.61]	5.06[3.90-6.22]
45-54 years	12.1[4.9-19.2]	0.29[0.06-0.51]	5.79[4.17-7.40]
55-64 years	17.8[8.7-26.8]	0.26[0.11-0.42]	4.37[2.95-5.79]
65-74 years	17.4[6.9-27.9]	0.51[0.11-0.91]	5.70[3.73-7.68]
≥ 75 years	9.8[0.3-19.4]	0.18[0.01-0.36]	3.52[1.99-5.05]
P value	*0.098*	*0.200*	*0.001*
Social grade			
A/B (highest)	4.2[0.7-7.7]	0.08[0.01-0.17]	3.85[3.04-4.67]
C1/C2	12.8[9.0-16.6]	0.23[0.14-0.32]	3.93[3.29-4.57]
D/E (lowest)	16.6[12.2-21]	0.40[0.25-0.54]	4.63[3.80-5.46]
P value	*0.003*	*0.006*	*0.299*
Borough			
Lambeth	12.1[7.9-16.3]	0.26[0.14-0.38]	4.07[3.29-4.84]
Southwark	16.4[11.6-21.2]	0.34[0.20-0.47]	4.64[3.80-5.47]
Lewisham	9.7[5.9-13.5]	0.21[0.09-0.33]	3.87[3.15-4.60]
P value	*0.094*	*0.360*	*0.370*

Table 3. Ethnic disparities in prevalence, extent and severity of oral impacts among 705 adults living in South East London

Outcome **OR**[b]	**Model 1**[a]		**Model 2**		**Model 3**	
	OR/RR[b]	[95% CI]	OR/RR	[95% CI]	OR/RR	[95% CI]
Prevalence of oral impacts						
White	1.00	[Reference]	1.00	[Reference]	1.00	[Reference]
Black	1.49	[0.91-2.43]	1.36	[0.81-2.27]	1.19	[0.71-2.00]
Asian	0.32	[0.06-1.63]	0.29	[0.06-1.46]	0.30	[0.06-1.56]
Extent of oral impacts						
White	1.00	[Reference]	1.00	[Reference]	1.00	[Reference]
Black	1.67	[1.20-2.33]**	1.47	[1.02-2.12]*	1.32	[0.91-1.92]
Asian	0.27	[0.08-0.87]*	0.26	[0.08-0.85]*	0.28	[0.08-0.94]*
Severity of oral impacts						
White	1.00	[Reference]	1.00	[Reference]	1.00	[Reference]
Black	1.20	[0.99-1.45]	1.12	[0.91-1.37]	1.11	[0.91-1.37]
Asian	0.89	[0.63-1.27]	0.89	[0.62-1.27]	0.92	[0.64-1.32]

[a] Model 1 was unadjusted; Model 2 was adjusted for sex, age group and borough of residence; and Model 3 also adjusted for social grade

[b] Binary logistic regression was fitted and odds ratios (OR) reported for the prevalence of oral impacts. Negative binomial regression was fitted and rate ratios (RR) reported for the extent and severity of oral impacts.

* $p<0.05$, ** $p<0.01$, *** $p<0.001$

Discussion

This study found ethnic disparities in OHQoL favouring members of ethnic minority groups living in South East London, England. Such ethnic disparities were found in the extent, but not in the prevalence or severity of oral impacts. What is more, those disparities were not wholly accounted for by demographic or socioeconomic differences between ethnic groups.

Our findings show that minority ethnic groups have similar or even better OHQoL than White respondents. All three subjective measures showed that Asian adults had fewer oral impacts on quality of life due to oral conditions than White and Black adults, although these differences were significant only for the extent of oral impacts. One possible explanation to these findings is that Asian adults have lower levels of oral disease than White respondents, thus leading to less impact on everyday life. However, recent studies among adults in East London (Delgado-Angulo *et al.*, 2015) and senior adults in South East London (Al-Haboubi *et al.*, 2014) showed that although Black and Asian participants had significantly lower levels of caries experience than White, the level of untreated decay was similar between groups. Furthermore, Asian adults had more teeth with periodontal pockets>4mm (Delgado-Angulo *et al.*, 2016) and reported greater use of dental services than White adults (Al-Haboubi *et al.*, 2013). An alternative explanation is the existence of different priorities between ethnic groups; Asian adults having more urgent needs in life to be met than those related to the condition of their mouth and teeth whereas White adults could identify better oral health impacts on their life through enhanced access to information and health education. This is in addition to evidence suggesting that people with the same state of health judge their quality of life differently according to their social standing (Mielck *et al.*, 2014). It is also possible that Asian adults with oral diseases may have learned how to cope with frequent symptoms during the course of their condition, which in turn become less distressing with every recurrence, leading to changes in internal standards, values and beliefs (i.e. response shift) (Schwartz and Sprangers, 1999).

This study also shows that socioeconomic factors explain part but not all the inequalities in OHQoL by ethnicity. The difference in extent of oral impacts between Black and White adults was fully attenuated whereas that between Asian and White adults was attenuated but remained significant after adjusting for social grade. This finding is in line with previous reports showing persist ethnic inequalities after adjustment for SEP measures both in the UK (Delgado-Angulo *et al.*, 2015, 2016) and other developed countries (Borrell *et al.*, 2003; Jimenez *et al.*, 2009; Sabbah *et al.*, 2009). In a review of UK literature on oral health inequalities, it was argued that "there are no differences in oral health among minority ethnic groups of the same socioeconomic status" and that "the inclusion of ethnicity as a variable [for dental caries] could divert attention from more important variables such as income and social class" (Watt and Sheiham, 1999). On the contrary, ethnic disparities in our sample were not wholly accounted for by socio-demographic factors. No evidence for a moderating effect of socioeconomic position on ethnic inequalities in OHQoL was found either. The fact that SEP measures explained only a small part of the ethnic differences in OHQoL implies that other factors may also underlie that relationship.

Some limitations of this study need to be borne in mind when interpreting the present findings. First, the fact that the analytical sample represented 56% of the target sample may raise concerns about its representativeness. However, data weighting was used to correct for differences in the probability of selection, to adjust for the key demographic differences between the sample and the entire population and to allow the generalisation of findings to the whole population, not just those who responded to the survey.

Second, we collapsed ethnic subgroups into broader ethnic groups due to the small number of participants in some subcategories. Some researchers argue that this approach ignores the heterogeneity that exists within broadly defined ethnic groups (Nazroo, 2003; Nazroo and Williams, 2005) while others see it as a good starting point to assess disparities in these groups before going into subgroups (Chaturvedi and McKeigue, 1994). Most comparisons in national survey reports are based on the same three main ethnic groups used in this study. More importantly, previous studies found no differences in oral health impacts between various ethnic subgroups (Newton *et al.*, 1999; Newton *et al.*, 2000), suggesting no loss of information when collapsing them into broader groups. Third, this study did not control for clinical oral health indicators that are known determinants of individuals' impacts on quality of life. However, clinical indicators are not considered as confounders of the association between ethnicity and oral impacts. Instead, they are regarded as mere intermediate factors.

Further research is needed to get a better understanding of the mechanisms that link ethnicity to oral health impacts in adults, for instance by exploring the influence of psychological factors, culture and health-related behaviours in the hypothesised association. Exploring the relative roles of different intermediate factors might help to identify those more amenable to intervention aiming to address oral health inequalities. Future studies could also explore disparities in oral health impacts by breaking down the three broad ethnic groups into small subgroups, and using alternative measures of oral health status and OHQoL and more precise measures of socioeconomic status.

Conclusion

This population-based study provides some evidence of disparities in oral health related quality of life between the three main ethnic groups in South East London, England. Asian adults had better and Black adults had similar oral health related quality of life than White adults after accounting for demographic and social factors.

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